Broadwave SA™ ORIGINAL
Creating Cable Competition with Northpoint Technology

EX PARTE OR LATE FILED

400 North Capitol Street, N.W.
Suite 368
Washington, D.C. 20001
(202) 737-5711 Office
(202) 737-8030 Fax
abush@sso.org

RECEIVED
FEB 1 2001
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

January 31, 2001

VIA HAND DELIVERY

Magalie Roman Salas, Secretary
Federal Communications Commission
The Portals, 445 12th Street, S.W., Room TW-B204
Counter TW-A325
Washington, DC 20554

Re: Written Ex Parte Communication in
ET Docket No. 98-206, RM-9147, RM-9245, DA 99-494

Dear Ms. Salas:

Pursuant to 47 C.F.R. Sec. 1.1206, Northpoint Technology, Ltd. and Broadwave USA, hereby provide the attached written *ex parte* submission in the above-referenced proceeding.

Respectfully submitted,

Antoinette Cook Bush
Executive Vice President
Northpoint Technology, Ltd.
Broadwave USA

Attachment

cc: Julius Knapp
Thomas Stanley
Thomas Derenge
Rebecca Dorch
Michael Marcus
Mark Oakey
Paul Locke

BroadwaveUSA™
Creating Cable Competition with Northpoint Technology

400 North Capitol Street, N.W.
Suite 368
Washington, D.C. 20001
(202) 737-5711 O
(202) 737-8030 F

January 31, 2001

RECEIVED
FEB 1 2001
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

By Hand Delivery

The MITRE Corporation
Attention: Jim Chadwick, Mail Stop W300
1820 Dolley Madison Blvd.
McLean, VA 22102

Dear Mr. Chadwick:

Pursuant to your request, I am enclosing the Northpoint Technology response to your questions for terrestrial system operators, with attachments:

- Example FCC application of Broadwave Richmond
- Comments and Reply comments of Northpoint Technology in ET Docket 98-206
- Report of the FCC Compliance and Information Bureau
- On Northpoint Field Trial in Washington DC, report by **Lucent Technologies**

We appreciate the opportunity to provide this information. If there are any questions or comments, please address them to the undersigned, or to Antoinette Cook Bush, Executive Vice President at the same number.

Sincerely,

Bob Combs
Director, System Development

cc: Magalie Roman Salas
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Northpoint Technology - Response to MITRE Request for Information

1. Please provide copies of your original filing with the FCC.

We are providing the original Northpoint petition for rulemaking, and an example application from Broadwave Albany et al.[1]

2. What range of azimuth angles do you intend to provide service to?

We want to make sure we understand this question. We plan to provide service to customers throughout any geographic area (such as a television market) where we initiate service, however, each of our terrestrial transmitters will each service a limited azimuth range based upon the Northpoint principles of maximizing service area while minimizing interference. Each cell is individually engineered as to transmission angle and power, which accounts for the satellite angles that need to be protected, and the presence or absence of satellite dishes in the immediate vicinity of the Northpoint transmitter. While our system is called 'Northpoint', it typically transmits in a 'southerly' direction; the actual range of azimuths will vary from location to location. From the DBS perspective, the antenna azimuth toward a given DBS satellite has a wide range across the country.[2] However, within any given Northpoint cell, the antenna azimuth toward a given satellite would not change.

3. Do you intend to use waveforms identical to those used for DBS systems? If not, please provide details about the waveform, modulation, filtering, etc. Please provide a spectral mask for the transmission.

The waveform is intended to be QPSK, which is identical to the current U.S. DBS offerings. We will supply the spectral mask at a future date, but prior to the beginning of testing.

4. What margin do you expect to operate with, and what availability do you design to?

The atmospheric margin and the consumer's signal availability will vary, depending upon where the customer is located within our service area, and in which part of the country the system is sited. At the edge of coverage, we design for an availability of 99.7% (See also answer to question 8 for rain model information).

---

[1] Northpoint petition for rulemaking supplied separately, the example application of Broadwave Richmond is enclosed.

[2] Echostar provides a handy utility for determining the azimuth and elevation towards its satellites see http://www.dishnetwork.com/content/cust_service/installation/azimuth_elevation/index.shtml. For example, the azimuth towards the DBS satellite at 119° from San Diego would be 170°, and from Washington D.C. would be 245°.

5. <u>What is the typical, minimum, and maximum HAAT that you expect to use for your transmitting antenna?</u>

Our typical HAAT in an urban area may be exemplified by our Washington D.C. conceptual design. In that design, the average HAAT was 330 feet. We have not established an absolute minimum deployment HAAT in an urban area, because of the many mitigation methods available. We anticipate that few transmitters will be located below 100 feet and these will operate at significantly lower power. The maximum HAAT is limited only by topography. For example, Mt. Wilson in California is approximately 5000 feet above the Los Angeles Basin. We anticipate that few transmitters will be sited above 1000 feet in an urban area.

6. <u>What service area radius do you expect to provide? How much will this vary and under what conditions?</u>

Our maximum service area radius for an EIRP of 12.5 dBm is about 10 miles on the transmitter boresight. This maximum radius will vary directly with the rain region and changes in transmit EIRP. In addition, this is a line of sight technology, and thus terrain and foliage have a significant impact on the service area radius. The smallest cell could be as small as a 1 km pocket when used as a gap-filler in varying terrain; the largest would likely be no more than 30 miles as in the case of Mt. Wilson. The Mt. Wilson example was described in our technical filings and it would operate at about 24.5 dBm.[3] This power level is made possible by both the unusual transmitter HAAT and the large uninhabited parkland surrounding the Mt. Wilson site.

7. <u>At what power levels do you expect to operate? How will you select a power level be for a particular transmitter installation? Do you expect to use any automatic power control?</u>

Northpoint technology is intended to operate at power levels ranging from about 7 to 27 dBm EIRP per 24 MHz carrier. Selection of power levels for a particular transmitter installation includes minimizing the received power level in populated areas near the transmitter, while maximizing the service area. Determination of the power level at each transmitter is an iterative design process that will take place within the guidelines established by the FCC. Automatic power control may be employed, but it is not intended to be used in a typical cell.

[3] "The Northpoint EPFD Mask," March 28, 2000, page 7. (*Ex parte* filing dated March 30, 2000.)

8. What rain model do you use in your calculations?

For rain attenuation along terrestrial paths, the rain model contained in ITU recommendation P.530-7 is used. For attenuation along satellite paths, the model contained in ITU Recommendation P.618-5 has been used.[4]

9. Please provide a copy of your analysis showing why you think interference into DBS receivers will not be a problem, or point us to the record.

The FCC notes in its recent decision in ET Docket 98-206[5] that Northpoint's extensive filings and tests demonstrate that interference into DBS receivers will not be a problem.[6] The basis of this decision is contained in the following documents in that docket, which we are providing copies of as attachments where required:

- Comments and Reply Comments of Northpoint Technology. (Demonstrating that interference into 99% of DBS customers will not even be measurable, much less harmful).[7]

- Progress Report WA2XMY, Northpoint – DBS Compatibility Tests (Demonstrating that multiple Northpoint cells can operate simultaneously in an urban environment without causing harmful interference).[8]

- Report of the FCC Compliance and Information Bureau on the tests conducted by Northpoint in Washington D.C., Oct 6, 1999. (Rejecting a finding of harmful interference claimed by DBS in the multiple cell tests).[9]

- On Northpoint Field Trial in Washington DC, report by **Lucent Technologies** (Bell Labs), Oct. 22, 1999, (Regarding the Northpoint Washington D.C. tests, concluding that the Northpoint impact on DBS would be negligible in all weather conditions).[10]

---

4 The FCC is proposing to use the latest version of ITU R P618-6 in the FNPRM.

5 "First Report And Order And Further Notice Of Proposed Rule Making" (FNPRM) in ET Docket 98-206, FCC No. 00-418.

6 As stated by the FCC in paragraph 214 of the FNPRM "Tests conducted in the 12.2-12.7 GHz band by Northpoint under an experimental authorization confirm that the MVDDS could operate without excessively impacting DBS subscribers.[6] Northpoint has also filed extensive technical studies to demonstrate that any impact on DBS operations would be minimal and could be mitigated using existing engineering techniques." Also see paragraph 216 of the FNPRM noting the extensive array of interference mitigation methods.

7 Documents are attached, except for Technical Annex to Comments of March 2, 1999, which was supplied separately, see letter to Jim Chadwick dated Jan 26, 2001.

8 Supplied separately, see letter to Jim Chadwick dated Jan 26, 2001.

9 Enclosed.

10 Enclosed.

- DBS-Terrestrial Compatibility Testing at Oxon Hill, Maryland. (Demonstrating that planar array antennas can effectively mitigate severe interference beyond that predicted under nominal Northpoint operating parameters).[11]

10. Please provide your analysis on rain scatter and its possible impact on interference.

In calculating the level of the interference into DBS, our approach has always been conservative with respect to the attenuation or scattering of the Northpoint signal due to rain. In our analysis, the only locations where any level of interference could even be measured would be within about 2 km of the transmitter. At this distance, ITU-R P 530 predicts less than 0.5-3 dB of attenuation, depending on rain region. Thus far, we have chosen to ignore the effects of scattering in our design. However, interference in an actual deployment will be lower than predicted in the design stage, due to this scattering.

11. What antenna technology do you plan to use at the transmit end?

Our technology uses a sector horn antenna for transmission.

12. Do you have specs for the transmit antenna, including backlobe and sidelobe performance? Please provide these. How man different vendors do you expect to use for your transmit antennas? If possible, tell us who they are.

We currently use Seavy for transmit antenna manufacture. We currently use two different antennas. Our transmit antenna patterns are provided in an appendix to this document.

13. How would you plan to deal with interference problems that might arise? What technical approaches do you plan to use to mitigate or eliminate these interference problems?

We understand this question to ask about interference mitigation techniques that can be used post-deployment. As described elsewhere each cell is individually engineered to minimize interference and maximize service area. We believe these techniques will likely eliminate the possibility of harmful interference in almost all cases. If an instance of interference arises post-deployment, we can use the following methods to minimize and eliminate harmful interference problems:

1. More accurately pointing DBS receive antennas toward the intended satellite;
2. Relocating DBS receive antennas so that they are naturally shielded;
3. Replacing smaller DBS receive antennas with larger DBS receive antennas;

[11] Supplied separately, see letter to Jim Chadwick dated Jan 26, 2001.

4. Artificially shielding DBS receive antennas from the transmitters;
5. Employing planar or other types of DBS antennas that have different back lobe characteristics.

14. Please provide the following documents:

- Northpoint Petition for Rulemaking, RM-9245
- Northpoint ex parte filing—March 17, 2000
- Northpoint ex parte filing—March 23, 2000
- Technical Annex to Northpoint March 2, 1999 comments.

These documents were provided separately to Mr. Jim Chadwick, see letter dated January 26, 2001.

15. How will you provide equipment to us for testing? When will it be available?

Northpoint technology equipment for testing can be shipped to the MITRE testing facility, but no earlier than February 8, 2001.

16. Please provide details on the channelization that you plan to use.

Channels will be 24 MHz, on 29.16 MHz centers, nominally according to the same center frequencies used by DBS. Channels may also be offset by 7.3 MHz from the DBS channels; such an offset will lessen the impact of interference into DBS transmitters.[12]

17. RF (or compatible IF) transmitter available in a "bench top" environment for controlled lab testing?

"Floor top" equipment is available for controlled lab testing.

18. Which DBS receivers do you think will be most vulnerable to interference, and why? Which DBS receivers do you recommend that we use for testing?

Our analysis and field tests demonstrate conclusively that there will be no measurable interference from Northpoint at about 99% of DBS receiver locations throughout our service area. For the 1% of systems nearest the transmitter, some measurable interference may be identifiable, but not harmful. In our experience, it makes little difference whether the DBS transmission protocol is DSS or DVB, although DSS appears to be slightly more robust than DVB, due to its lower required Eb/No to maintain full picture (the "freeze frame" point).[13]

---

12 See e.g. ITU-R Recommendation BO.1293-1, "Protection masks and associated calculation methods for Interference into broadcast-satellite systems involving digital emissions."

13 DVB and DSS are the MPEG transmission protocols used respectively by Echostar and DirecTV.

Our testing shows that the DBS signal quality varies both in time, and in space.[14] Our testing in clear air conditions showed that– in the absence of external interference – the DBS signal strength varied from one minute to the next as well from place to place. This was true whether measured by the DBS set-top-box meter, or by professional demodulation equipment.[15] We found the inherent variance in the DBS signal to be more significant than the possible impact of Northpoint interference. We feel this variance in DBS signal quality should be considered in any analysis of interference into DBS systems.

Our interference calculations have been based upon the 18" (45 cm diameter) offset feed antenna. This antenna has a known deficiency in that there is a direct ray trace to the LNB from two azimuths at approximately 120 and 240 degrees off boresight. The gain at this point is approximately -2 dBi. There are other antennas in use in the continental U.S.; for example, Echostar uses a "Dish 500" system with a dual LNB. The dual LNB allows a customer to tune his set top box to either the 119° or 110° satellite at any given time. Because it is wider than 45 cm, we believe this antenna to have better signal rejection characteristics than the 45 cm offset feed reflector antenna. Other antennas, such as the 60 cm or larger antennas all have better rejection characteristics towards the horizon than the widely used 45 cm antenna.

The most recent official DBS system parameters are described in ITU-R BO.1444, and the associated Appendix 1, which is available at the following URL:

http://www.itu.int//itudoc/itu-r/sg11/docs/sg11/1998-00/contrib/138e2.html.

The parameters described in this document were furnished by the DBS industry for evaluation of sharing with NGSO FSS in the ITU. The following links contained in this document represent the common links currently in operation in the continental U.S.

> US-GSO 1(a), US-GSO D1(a), US-GSO D2(a), US-GSO D3(a), US-GSO D6(a), US-GSO D7(a), US-GSO D8(a), US-GSO D9(a), US-GSO D10(a), US-GSO D12(a), US-GSO 4A3, US-GSO 4A5, US-GSO 4A6, US-GSO 4A8, US-GSO 4A9, US-GSO 4A10, US-GSO 4D2, US-GSO 4D3, US-GSO 4D5, US-GSO 4D8, US-GSO 4D9, US-GSO 4B2, US-GSO 4B3, US-GSO 4B5, US-GSO 4B6, US-GSO 4B8, US-GSO 4B9, US-GSO 4B10, US-GSO 4C2, US-GSO 4C3, US-GSO 4C5, US-GSO 4C6, US-GSO 4C8, US-GSO 4C9, US-GSO 4C10, US-GSO 1(b), US-GSO D1(b), US-GSO D2(b), US-GSO D3(b), US-GSO D6(b), US-GSO D7(b), US-GSO D8(b), US-GSO D9(b), US-GSO D10(b), US-GSO D12(b), US-GSO 1(b), US-GSO D1(b), US-GSO D2(b), US-GSO D3(b), US-GSO D6(b), US-GSO D7(b), US-GSO D8(b), US-GSO D9(b), US-GSO D10(b), US-GSO D12(b).

Our criterion for link failure is "loss of full picture," as described in ITU-R Recommendation BO.1444, Annex 1 (document referenced above). This recommendation references two different performance objectives. The most relevant one for DBS system performance is the C/N value at which actual loss of picture occurs, the

---

14 See extensive discussion on this variance in the Progress Report WA2XMY, October 1999, pages 8 - 16.

15 The set-top-box or integrated receiver decoder (IRD) unit displays a 'signal strength' intended to aid the consumer in pointing their antenna.

"freeze frame" C/N performance point.[16] For example, for DirecTV 6/7 rate Viterbi coded signal, the actual loss of picture (freeze frame) occurs at 6.1 dB C/N. Our experience has been that the user cannot even perceive picture degradation unless the C/N is very close to the "freeze frame" point, and this is certainly below the "operational threshold." The other performance point, the so-called 'operational threshold' is typically set at 1.5 dB higher than the loss of picture. This 'operational threshold' hides actual system margin.

[16] See footnote (2) in the spreadsheet in this Annex, which states that the freeze frame point is the point where "the high frequency of data errors causes the MPEG decoder to cease providing full pictures."